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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/561,581 | 12/19/2005 | Manuel Gaudon | 355901-1860 | 6470 |

38706 7590 07/31/2009

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| EXAMINER | |
|---|---|
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| ART UNIT | PAPER NUMBER |
|---|---|
| 1792 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 07/31/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/561,581 | GAUDON ET AL. | |
| | Examiner | Art Unit | |
| | NATHAN H. EMPIE | 1792 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *26 May 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

Examiner acknowledges receipt of 5/26/09 amendment to the specification and claims which was entered into the file. Claims 1-28 are currently pending.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 23 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. As recently amended, claim 23 recites the limitation: "wherein the calcination temperature is maintained for a time of 2 seconds to 10 h". Such a limitation was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. According to applicant's specification (see, for example, pg 22 lines 30 – 32) only time ranges such as (1) a few seconds, (2) 2 seconds to several hours, and (3) 1 to 10 hours have been adequately described.

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7, 9-11, 13, 19-23, 25 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nonninger et al (WO 02/086194, as supplied by applicant's IDS, the examiner will be making references in regard to English equivalent US 2004/0115416 A1; hereafter Nonninger), in view of Mukherjee et al. ("Correlation Between Slurry Rheology, Green Density, and Sintered Density of Tape Cast Yttria Stabilized Zirconia" Ceramics International 27 (2001) 731-739; hereafter Mukherjee) and Bitterlich et al. ("Rheological Characterization of Water-Based Slurries for the Tape Casting Process" Ceramics International 28 (2002) 675-683).

3. Claim 1: Nonninger teaches a method of preparing a metal oxide layer on a substrate (see, for example, abstract), comprising the following successive steps of:

4. dispersing a metal oxide powder (see, for example, [0012-0013], preferably a ysz is taught) in a liquid medium comprising a dispersion solvent (see, for example, [0020], such as water) and a dispersant (see, for example, [0019]), the said liquid medium containing neither plasticizer nor binder, by means of which a suspension A of the said metal oxide powder in the said liquid medium is obtained (see, for example, in [0029] wherein YSZ particles, and a dispersant are first mixed prior to subsequent polymer additive additions);

5. adding at least one polymer to the suspension A, obtaining suspension B (see, for example, further polymeric additives ([0016], [0029], [0031]) being added after mixing suspension A (see, for example, [0029], [0031]).

6. depositing suspension B on the substrate by a dip coating method by means of which a green layer is obtained (see, for example, [0009], [0011], [0029], [0031]),

7. the green layer is dried and calcined to obtain said metal oxide layer on said substrate (see, for example, [0011], [0029], [0031])

8. Nonninger does not explicitly teach wherein the polymer added to suspension A is in a solution with a solvent, and Nonninger does not explicitly teach wherein in all situations the polymer is added separately and following to the dispersant. Mukherjee teaches a method of making ceramic layers (specifically YSZ) via wet chemical suspension routes (see, for example, abstract). Mukherjee further teaches that it is well known in the art that the sequence of adding additives to a suspension is critical, namely the dispersant has to be added before the other polymeric additives properly break down any agglomerates generating a proper dispersion (pg 732). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have added the polymer / binder species subsequent to the dispersant, as taught by Mukherjee, to avoid competitive adsorption and break down any agglomerates in the method of Nonninger. Bitterlich teaches a method of making stable ceramic suspensions (specifically for t-YSZ, pg 676) for coating processes (see, for example, abstract, pg 675-676), which further involve a two step mixing process wherein the powder / solvent / dispersant are first prepared and mixed, and then solution of a polymer (binder) / solvent are added to the first mixture (see, for example, pg 676-677). Bitterlich teaches that it is well known in the art to provide a binder with a solvent to predictably add a binder to suspension (see, for example, pg 676-677). As both

Nonninger and Bitterlich teach methods wherein a polymeric / binder addition if applied following dispersant addition, and as both are directed to methods of forming films of ceramic (specifically yttrium stabilized zirconia) would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated the polymer / binder in a solution with a solvent as the means to introduce the polymer / binder in the method of Nonninger in view of Mukherjee, as Bitterlich has taught that polymeric additives can predictably be incorporated into dispersions with a solvent, and as one of ordinary skill in the art would appreciate that additions of solvent can be used to control the viscosity and mixing behavior of the suspension.

9. Claims 2 and 3: Nonninger further teaches wherein the oxide layer has a thickness of between 100 nm and 10 microns (see, for example, [0023]). Although Nonninger does not explicitly teach the oxide layer having a thickness of 1 to 100 microns, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated such a claimed thickness since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

10. Claim 4: Nonninger further teaches a variety of metal oxides, including simple oxides of transition metals and lanthanides (see, for example, [0012]).

11. Claim 5: Nonninger further teaches wherein the metal oxide is preferably an yttrium stabilized zirconia ([0013]) and Bitterlich further explicitly teaches a YSZ with a cubic structure (see, for example TZ8Y, pg 676 section 2.1).

12. Claim 6: Nonninger further explicitly teaches the dispersion solvent as water (see, for example, [0020])

13. Claim 7: Mukherjee explicitly teaches a preferred solvent for a YSZ suspension as an azeotropoic mixture of methyl ethyl ketone and ethanol (pg 732).

14. Claim 9: Nonninger further teaches wherein the metal oxide powder particles have a size of between 3 nm and 100 nm (see, for example, [0026]); although Nonninger does not explicitly teach 5 nm to 5 microns; it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated such a claimed size since in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

15. Claims 10 and 11: Nonninger further teaches wherein the dispersant is chosen from ionic and non-ionic surfactants (surface active molecules) (see, for example, [0019]). Additionally, Mukherjee explicitly teaches that phosphate ester is a popular dispersant for YSZ suspensions (pg 732).

16. Claim 13: Nonninger further teaches wherein the polymer is chosen from poly(aliphatic) esters (see, for example, polyester, [0016]).

17. Claim 19: Nonninger further teaches wherein the drying is conducted at 80°C. (see, for example [0029]).

18. Claim 20: None of Nonninger, Mukherjee, or Bitterlich explicitly teach the duration of drying. The examiner takes official notice that it is well known in the art that the duration of drying is a result effective variable, influencing a balance between

shorter processing times and complete drying and as such it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a drying time of from 1 min to 10 hrs since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

19. Claim 21: Nonninger further teaches wherein the calcination step is conducted at 500°C ([0029]). And alternatively, Bitterlich further teaches calcining YSZ at 650°C, 1200°C (see, for example, pg 677).

20. Claim 22: Nonninger further teaches wherein the heating rate 5°C / min (5 K / min) (see, for example, [0029]). And alternatively, Bitterlich further teaches firing YSZ at heating rates of 25°C / min and 60°C /min (see, for example, pg 677).

21. Claim 23: Nonninger further teaches wherein the calcination temperature is held for 1 hour (see, for example, [0029]). Alternatively Bitterlich further teaches a hold for 3 hours (see, for example, pg 677).

22. Claims 25 and 27: Nonninger further teaches wherein the substrate is a fully dense substrate (see, for example, steel substrate, [0029]).

23. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nonninger in view of Mukherjee and Bitterlich as applied to claim 1 above, and further in view of Valente et al (US patent 5,244,691, hereafter Valente)

24. Claim 14: Nonninger in view of Mukherjee and Bitterlich teach the method of claim 1, but none explicitly teaches wherein the polymer is a polymer obtainable from the reaction between hexamethylenetratramine and acetylacetone in acid medium. Valente teaches a method of depositing thin ceramic films (see, for example, abstract). Valente further teaches that it is well known in the art to use a polymer formed from a reaction between a hexamethyelenetetramine and acetylacetone in an acid medium as a binding additive which aids in determining the viscosity and rheology of the coating composition (see, for example, abstract, and col 3 lines 1 – 41). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a polymer obtainable from the reaction between hexamethylenetratramine and acetylacetone in acid medium as the polymer in the method of Nonninger in view of Mukherjee and Bitterlich as such a polymer is well known in the art, and can predictably help to control the viscosity of the coating composition.

25. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nonninger in view of Mukherjee and Bitterlich as applied to claim 1 above, and further in view of Haruta et al (US 2003/0152704; hereafter Haruta).

26. Nonninger in view of Mukherjee and Bitterlich teach the method of claim 1, but none explicitly teach wherein the solution of at least one polymer further more contains the same metals as those of the metal oxide powder. Haruta teaches a method of applying a metal oxide coating via dipcoating to a substrate surface (see, for example, abstract, [0092]). Haruta further teaches wherein the coating composition comprises a

ceramic oxide (such as titanium oxide particles, see, for example, [0074], [0086]) and the addition of a halide of the same metal (such as titanium halide, which provides Ti metal, see, for example, [0080]). Haruta teaches that such an addition of metal species is well known in the art to improve coating properties such as density (see, for example [0249]-[0251]). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have further incorporated the same metals as those of the oxide powder into the coating composition of Nonninger in view of Mukherjee and Bitterlich, as Haruta has taught that the addition of metal species has improve coating properties such as density. Nonninger in view of Mukherjee, Bitterlich, and Haruta do not explicitly teach wherein the same metals are added specifically at the polymer solution step, but it would have been obvious to one of ordinary skill in the art at the time of invention to have added the metal species to the polymer solution since the "selection of any order of mixing ingredients is *prima facie* obvious" In re Gibson, 39 F2d 975, 5 USPQ 230 (CCPA 1930) MPEP 2144.04 IV. C.

27. Claims 8, 12, and 16 -18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nonninger in view of Mukherjee and Bitterlich as applied to claim 1 above, and further in view of Lee ("Dip Coating of Alumina Films by the Sol-gel Method" J. Mater. Res. Vol. 8, No.12, Dec 1993, 3151-3157; hereafter Lee).

28. Claims 8, 12, and 16-18: Nonninger in view of Mukherjee and Bitterlich teach the method of claim 1, wherein Nonninger teaches the coating is applied by dipcoating ([0009]), but none explicitly teach wherein the metal oxide powder content in the initial

oxide suspension of 1 to 80%, the mass content of dispersant in the initial oxide suspension of from 0.1 to 10% by weight relative to the mass of dry metal oxide powder dispersed, the viscosity of the polymer solution is 5 mPas to 1000 mPas, to combine the polymer solution and the initial oxide suspension in a mass ratio of 0.01 to 3, nor wherein the step of removing the substrate from the final suspension is at a controlled rate of 0.1 to 100 cm/min. Lee teaches a method of forming an oxide layer onto a substrate via a dipcoating method (see, for example, abstract). Lee further teaches that it is well known in the dipcoating art that factors including oxide concentration, solution viscosity, and the rate of withdrawal will influence the final coating properties such as thickness and uniformity (see, for example, pg 3154-3155). Further, one of ordinary skill in the art would appreciate that the amount of dispersant and viscosity of the polymer solution would influence the final suspension viscosity, and wherein the mass content of each suspension and solution and their mass ratio to each other would influence the final suspension's oxide concentration. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a metal oxide powder content in the initial ceramic suspension of 1 to 80%, a mass content of dispersant in the initial ceramic suspension of from 0.1 to 10% by weight relative to the mass of dry metal oxide powder added, a polymer solution viscosity of 5 mPas to 1000 mPas, to combine the polymer solution and the initial oxide suspension in a mass ratio of 0.01 to 3, and to incorporate a controlled substrate removal rate of 0.1 to 100 cm / min since these factors are known as result effective variables, and since it has been held that where the general conditions of a claim are disclosed in the prior art,

discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

29. Claims 24, 26, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nonninger in view of Mukherjee and Bitterlich as applied to claim 1 above, and further in view of Seabaugh et al. (US 2003/0003237; hereafter Seabaugh).

30. Claims 24, 26, and 28: Nonninger in view of Mukherjee and Bitterlich teach the method of claim 1 and 27, wherein Nonninger further teaches the substrate as metal, glass, enamel or ceramic (see, for example [0023]). Nonninger further teaches wherein the coatings can serve in a variety of catalytic, electrolyte, and solar cell applications ([0002]), and that the coating composition is preferably a yttrium stabilized zirconium ([0013]). Seabaugh teaches a method of applying a YSZ coating via a wet chemistry method for a variety of electrochemical system applications (see, for example, abstract, [0002]).

31. Claim 24: Nonninger in view of Mukherjee and Bitterlich do not explicitly teach wherein the metal oxide layer and the substrate undergo a co-sintering operation. Seabaugh further teaches wherein a YSZ coating layer is applied to an un-sintered ceramic substrate (see, for example, abstract, and [0062]). Seabaugh further teaches that when co-sintering the coating and substrate cracking can be avoided and dense and leak tight films can be produced (see, for example, [0014]). Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated a co-sintering operation into the method of Nonninger in view of Mukherjee

and Bitterlich, as Seabaugh has taught that YSZ coating can be predictably applied to substrates via co-sintering, and since co-sintering processes help to prevent substrate / coating cracking.

32. Claim 26: Nonninger in view of Mukherjee and Bitterlich do not explicitly teach wherein the substrate is a porous substrate ranging up to 50% by volume porosity. Seabaugh teaches it is well known in the art to apply a YSZ formed by wet chemistry method to a porous substrate of a ceramic electrode material, as such an articles performs well for solid oxide fuel cell, ceramic oxygen generation system, and ceramic membrane reactor applications, and that YSZ can be predictably applied to porous substrates (see, for example, [0002], and Fig 5a-c wherein the porosity of the substrate is less than 50%). As both Seabaugh and Nonninger in view of Mukherjee and Bitterlich teach wet chemistry methods of producing YSZ coatings and Seabaugh has taught the motivation to apply YSZ coating to porous substrates to take advantage of a variety of functional applications, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated the porous substrate such as those taught by Seabaugh (wherein the porosity of the substrate is less than 50%) into the method of Nonninger in view of Mukherjee and Bitterlich to obtain the predictable result of forming a YSZ coating on a substrate, with the added advantage of applying the article formed to serve in solid oxide fuel cell, ceramic oxygen generation system, and ceramic membrane reactor applications.

33. Claim 28: Nonninger in view of Mukherjee and Bitterlich do not explicitly teach wherein the substrate is a porous Ni-YSZ cermet substrate. Seabaugh teaches it is well

known in the art to apply a YSZ formed by wet chemistry method to a porous substrate such as a of a ceramic electrode material, as such an articles performs well for solid oxide fuel cell, ceramic oxygen generation system, and ceramic membrane reactor applications, and that YSZ can be predictably applied to porous substrates such as Ni-YSZ (see, for example, [0002], [0011]). As both Seabaugh and Nonninger in view of Mukherjee and Bitterlich teach wet chemistry methods of producing YSZ coatings and Seabaugh has taught the motivation to apply YSZ coating to porous substrates, such as Ni-YSZ to take advantage of a variety of functional applications, it would have been obvious to one of ordinary skill in the art at the time of invention to have incorporated applying the YSZ coating to porous Ni-YSZ substrate as taught by Seabaugh into the method of Nonninger in view of Mukherjee and Bitterlich as it is well known in the art to use porous Ni-YSZ cermets as substrates for YSZ coating and wherein the YSZ coated article would possess the added advantage to serve in solid oxide fuel cell applications.

***Response to Arguments***

34. Applicant's amendment of claim 11 filed 5/26/09 has been fully considered and is persuasive with respect to the 35 USC 112 2nd paragraph rejection of claim 11. The 35 USC 112 2nd paragraph rejection of claim 11 has been withdrawn.

35. Applicant's arguments filed 5/26/09 have been fully considered but they are not persuasive.

36. **1.A.:** Applicant argues that "Bitterlich teaches that a polymeric emulsion, and not a polymeric solution was added to the dispersed metal oxide powder to prepare the

tape casting slurry", and "the Examiner has not demonstrated that an emulsion or dispersion of a polymer is equivalent to a polymer solution". In response the examiner directs the applicant's attention to applicants own specification (see, for example, pg 13 line 30 – pg 15 line 8) it would appear that a sol is considered as a "solution". The examiner asserts that a sol is well known in the art as a liquid colloidal dispersion. Similarly according to Bitterlich: "The emulsion binders, which are colloidal dispersions of a polymer in water..." (pg 675 1st paragraph). As the applicant's own invention encompasses polymeric sols as solutions, the prior art should be privy to just such a scope, and as such presents sufficient teaching to a medium that would be considered a solution by applicant's standards. Additionally, the examiner cites prior art references Graham et al (US 2005/010697): "The term 'solution', as defined herein is understood to include liquids systems, gaseous sytems, gels, suspensions, colloids, slurries, emulsions, and the like, and mixtures of any two or more or the forgoing" ([0038]); and Scholtz et al. (US patent 5,723,174) "The term 'solution' as used herein includes dispersion or suspensions of finely divided inorganic metal oxide particles in a liquid medium" (col 5 lines 14 - 16); to further support that the art has recognized emulsions, and colloidal dispersions as solutions; and therefore the cited prior art has sufficiently taught polymer solutions.

37. **1.B:** Applicant argues that the cited references teach away from the claimed invention. Specifically, the applicant argues: "Nonninger only exemplifies methods of depositing solution that deposited by immersion coating method", the examiner asserts that "the prior art's mere disclosure of more than one alternative does not constitute a

teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed..." In re Fulton, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004). Nonninger has explicitly taught that "Suspensions or pastes of ceramic particles are initially used which are applied via shaping methods such as e.g. dip coating, spin coating...etc. which are known to a person skilled in the art" ([0004]), additionally claim 1 of Nonninger describes a process wherein a ceramic suspension "has a solid content of nanoparticles of >30% per volume is applied onto the substrate by dip-coating, spin-coating, immersion, ..." (pg 3, claim 1). As such Nonninger has not taught away from the claimed process.

38. Further Applicant has argued unexpected results with regard to the thickness results obtained according to applicant's invention (bottom of pg 10 of remarks). The examiner asserts that one of ordinary skill in the art would instantly appreciate that thickness in a dip coating process is well known to be controlled by the viscosity and the withdrawal rate. Furthermore the applicant's cited support for these unexpected results (examples 1 and 2) are not commensurate in scope with at least independent claim 1 as specific chemistries, proportions, reaction times, reaction temperatures, viscosities, withdrawal rates, and further reaction parameters exist in these examples, but they are not explicitly recited in claim 1. Thus, there is no showing that the objective evidence of nonobviousness is commensurate in scope with the claims.

39. With respect to applicant's argument that Nonninger teaches "at least one oxycarboxylic acid" (pg 11 or remarks) and "Applicants' claimed invention makes no

reference to oxycarboxylic acid"; and similarly with respect to applicant's argument that "Mukherjee teaches that the suspension should be milled thoroughly, for hours, to break down agglomerates. No such milling is performed in the claimed invention..." (pg 11 of remarks) and "Bitterlich discloses prolonged ball milling, for 66 hours, ..." (pg 12 or remarks). The examiner asserts that it is noted that the features upon which applicant relies (i.e., not including an oxycarboxylic acid, and not milling) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The applicant's claim is written with the open term "comprising" allowing for additions beyond what exists to be included. Further In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

40. **1.C.:** Applicant argues that there was no suggestion or motivation to combine prior art references.

41. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in

the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). Furthermore, prior art that is in a field of endeavor other than that of the applicant or solves a problem which is different from which the applicant was trying to solve, may also be considered for the purposes of 35 U.S.C. 103 "[t]he first error... in this case was... holding that courts and patent examiners should look only to the problem the patentee was trying to solve. The Court of Appeals failed to recognize that the problem motivating the patentee may be only one of many addressed by the patent's subject matter... The second error [was]... that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem." *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007). Additionally, in response to applicant's argument that "Based on Bitterlich and Mukherjee, since they do not disclose any need to alter the tape casting process there is no motivation to modify or combine Bitterlich, Mukherjee, and /or Nonninger...Similarly Nonninger mentions no drawbacks of the immersion or dip coating process method to provide motivation to modify or combine Bitterlich, Mukherjee, and/or Nonninger and arrive at the claimed invention" the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). The examiner asserts that one would be hard-pressed to find

any patent which would criticize its own teachings. The examiner asserts that primary reference Nonninger has taught the lion's share of claim 1, but without explicitly teaching per every embodiment the specific sequence of ingredients that were added. The examiner asserts that secondary references Mukherjee and Bitterlich were incorporated to provide a basis as to what knowledge is generally available to one in the ceramic coating art with regard to the sequence of adding additives to a suspension. The teaching of Mukherjee that the dispersant has to be added before the other polymeric additives to properly break down any agglomerates generating a proper dispersion (pg 732) possesses proper motivation in that following this sequence one avoids competitive adsorption and properly breaks down any agglomerates in the method of Nonninger. The teaching of Bitterlich to incorporating polymeric additives as a solution with a solvent possess proper motivation as one of ordinary skill in the art would appreciate that additions of solvent can be used to control the viscosity and mixing behavior of the suspension and additives. Furthermore, with regard to changes in sequences of adding ingredients the examiner asserts "Selection of any order of mixing ingredients is prima facie obvious" *In re Gibson* 39 F.2d 975, 5 USPQ 230 (CCPA 1930).

42. **1.D:** Applicant argues that there was no reasonable expectation of success to combine.

43. The applicant has asserted that "The claimed invention arises, in part, out of the surprising discovery that a suspension of metal oxide powders is useful for dip coating. Suspensions or slurries are customarily used for tape casting". The examiner asserts

that dip coating with a metal oxide suspension is far from surprising to one of ordinary skill in the art, and that suspensions are well known to be used in applications beyond only tape casting as primary reference Nonninger has explicitly taught that "Suspensions or pastes of ceramic particles are initially used which are applied via shaping methods such as e.g. dip coating, spin coating...etc. which are known to a person skilled in the art" ([0004]). Again as explained in the previous paragraph the examiner asserts that primary reference Nonninger has taught the lion's share of claim 1, including the "variety of components in a dip coating" suspension, so Applicant's arguments directed toward the interactions of the varieties of components is not appropriate as such appropriate and predictably interacting components are all within the teaching of Nonninger. Basically Nonninger fails in explicitly teaching, per every embodiment, the specific sequence of ingredients that were added. As the "Selection of any order of mixing ingredients is prima facie obvious" *In re Gibson* 39 F.2d 975, 5 USPQ 230 (CCPA 1930); and supporting secondary references have further provided a basis to well known and predictable practices in the art with regard to such sequences, such a combination is appropriate and the rejection is maintained.

44. **2.:** Rejections made over cited prior art further in view of Valente.

45. Applicant argues that "While Valente discloses wafer-spinning deposts of homogeneous solution, claim 14 is directed to a dip coating method, which the Applicants surprisingly found with suspensions of metal oxides. Therefore, Valente teaches away from claim 14" The examiner is unsure as to the entire reasoning and basis for applicant's assertion of "teaching away", the examiner asserts that "the prior

art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed..." In re Fulton, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004). Just because Valente teaches a spin-coating deposition method does not satisfy the burden of "teaching away" nowhere in the Valente reference is there any discrediting of a dipcoating method. Furthermore, as asserted in the previous paragraph, dip coating with a metal oxide suspension is far from surprising to one of ordinary skill in the art: "Suspensions or pastes of ceramic particles are initially used which are applied via shaping methods such as e.g. dip coating, spin coating...etc. which are known to a person skilled in the art" (Nonninger [0004]). Additonally as primary reference Nonninger is directed to both dip-coating and spin-coating ceramic coating compositions ([0004], claim 1, for example), and Valente teaches that it is well known in the art to use a polymer formed from a reaction between a hexamethyelenetetramine and acetylacetone in an acid medium as a binding additive which aids in determining the viscosity and rheology of the coating composition (see, for example, abstract, and col 3 lines 1 – 41) and it is appropriate to combine the references as such an incorporation can predictably help to control the viscosity of the coating composition. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

46. **3.:** Rejections made over cited prior art further in view of Haruta.

47. Applicant argues that "Haruta teaches away from the invention" The examiner is unsure as to the entire reasoning and basis for applicant's assertion of "teaching away", the examiner asserts that "the prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed..." In re Fulton, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004). Just because applicant asserts Haruta teaches a spray coating deposition method does not satisfy the burden of "teaching away" nowhere in the Haruta reference is there any discrediting of a dip coating method. Furthermore, as asserted in the previous paragraph, dip coating with a metal oxide suspension is far from surprising to one of ordinary skill in the art: "Suspensions or pastes of ceramic particles are initially used which are applied via shaping methods such as e.g. dip coating, spin coating...spraying...etc. which are known to a person skilled in the art" (Nonninger [0004]). Additionally as primary reference Nonninger is directed to both dip-coating and spraying ceramic coating compositions ([0004], claim 1, for example), and Haruta teaches Haruta teaches a method of applying a metal oxide coating via dipcoating to a substrate surface (see, for example, abstract, [0092]). Haruta provides the motivation for incorporating an addition of metal species into the metal oxide coating composition since it is well known in the art that such additions improve coating properties such as density (see, for example [0249]-[0251]). As such it is appropriate to combine the references. In response to applicant's arguments against the references individually,

one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

48. **4.:** Rejections made over cited prior art further in view of Lee.

49. Applicant argues that "Lee teaches away from the claimed invention by teaching how to coat an aluminum alkoxide solution on stainless steel" The examiner is unsure as to the entire reasoning and basis for applicant's assertion of "teaching away", the examiner asserts that "the prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed..." In re Fulton, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004). Just because applicant asserts Lee teaches a dip coating method with an Al-alkoxide solution does not satisfy the burden of "teaching away" nowhere in the Lee reference is there any discrediting of method of the prior art. Furthermore one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner asserts that Lee is a secondary reference relied upon solely as it provides a basis to the level of one of ordinary skill in the art to recognize that oxide concentration, viscosity, amount of dispersant mass content of each suspension and solution and their mass ratio to each other are result effective variables. The examiner has not explicitly incorporated

specific ranges from Lee for these result effective variables. Additionally in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., wherein a sol is higher than 10 mPa.s) are not recited in the rejected claim(s) (claim 16 requires a solution viscosity of 5 to 1000 mPa.s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

50. **5.:** Rejections made over cited prior art further in view of Seabaugh.

51. Applicant argues that "Seabaugh teaches away from the claimed invention by disclosing and teaching spray coating methods..." The examiner is unsure as to the entire reasoning and basis for applicant's assertion of "teaching away", the examiner asserts that "the prior art's mere disclosure of more than one alternative does not constitute a teaching away from any of these alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed..." In re Fulton, 391 F.3d 1195, 1201, 73 USPQ2d 1141, 1146 (Fed. Cir. 2004). Just because applicant asserts Seabaugh teaches only a spray coating deposition method does not satisfy the burden of "teaching away"; nowhere in the Seabaugh reference is there any discrediting of a dip coating method. Furthermore, as asserted in the previous paragraph, dip coating with a metal oxide suspension is far from surprising to one of ordinary skill in the art: "Suspensions or pastes of ceramic particles are initially used which are applied via shaping methods such as e.g. dip coating, spin coating...spraying...etc. which are known to a person skilled in the art" (Nonninger [0004]). Furthermore, primary

reference Nonninger is directed to both dip-coating and spray coating ceramic coating compositions ([0004], claim 1, for example), one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

As to the dependent claims, they remain rejected as no separate arguments are provided.

In view of the forgoing, the totality of the applicant's arguments and evidence towards nonobviousness fails to outweigh the evidence of obviousness. The examiner maintains his rejections.

***Conclusion***

52. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATHAN H. EMPIE whose telephone number is (571)270-1886. The examiner can normally be reached on M-F, 7:00- 4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on (571) 272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/N. H. E./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792